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(71)Applicant : TORAY IND INC

(72)Inventor : KAWANOMOTO YASUYUKI
ONISHI HIROSHI
SHIMIZU NOBUHIKO
KIMOTO YUKITSUGU
OCHI HIROSHI

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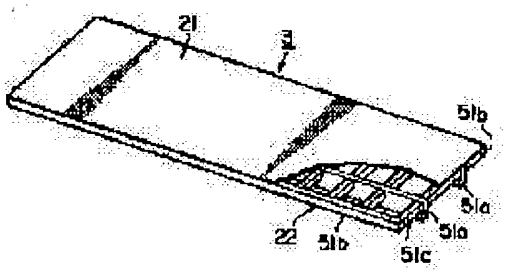
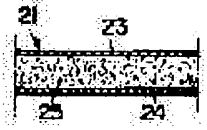
## (54) TRUCK PANEL AND CARGO COMPARTMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To be excellent in processability and assembling property as well as lightweighted and having sufficient rigidity and strength by possessing an FRP board containing a reinforced fiber texture as a rigidity member.

SOLUTION: A floor panel 3 is made as an integral molding of a panel member 21 composed of an FRP board and a reinforced member 22 provided on the back side. The panel member 21 is composed of an inner panel 23 having two sheets of FRP boards containing a reinforced fiber texture arranged in the inside of a cargo compartment and an outer panel 24 arranged on the outside thereof, and is made a sandwich structure with a

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core material 25. Thus it is excellent in lightweighting effect, assembling operation is facilitated, manufacturing cost is reduced, and pay load can be increased.

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* NOTICES *



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## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the new structure of having the panel constituted especially using FRP (fiber reinforced plastics), about the cargo compartment for trucks which used the panel for trucks, and it.
[0002]
[Description of the Prior Art] While installing the floor panel which uses as the base the aggregate formed with the metal frame material for example, on the body chassis as structure of the cargo compartment of a truck and attaching a portal frame on a floor panel further, the center section of the portal frame of order is connected by the center beam, and the so-called cargo compartment of the wing structure which has been over up and enabled it to rotate the side attachment wall and head-lining part of right and left of a cargo compartment is known.
[0003] According to such structure, receipts and payments of the cargo to a cargo compartment become possible not only from the backside of a cargo compartment but from a longitudinal direction, and can aim at improvement in workability.
[0004] The conventional cargo compartment is constituted using steel or aluminum material. For example, as shown in drawing 42 , the aggregate 304 is constituted from a floor panel by the square bar 301 made from steel arranged at the longitudinal direction of a truck, the angle bar 302 made from steel arranged crosswise [ of a truck ], and the angle bar 303 made from steel arranged at both sides. On this aggregate 304, as flooring, a plywood 305 is joined by a bis-stop etc. and the floor panel 306 is constituted.
[0005] Moreover, a wing panel has the head-lining section and the side-attachment-wall section, as shown in drawing 43 . The rail material 311 prolonged in the longitudinal direction of a truck is connected by the rail mold material 312 arranged at the predetermined spacing, the aggregate 313 is constituted, the aluminum panels 314 and 315 are stuck on the outside surface, and the wing panel 316 is constituted.
[0006] In addition, while attaching a frame before and after installing the floor panel which uses as the base the aggregate formed with the metal frame material on the body chassis as a gestalt of the cargo compartment of a truck and forming on a floor panel further at a portal Connect the frame of order in an up right-and-left location, and the side attachment wall of right and left of a cargo compartment and a head-lining part are constituted from metal skin material. The gate on either side, the common body mold cargo compartment constituted by the rear door are known by installing the floor panel which uses as the base the aggregate formed with the metal frame material the so-called van type which installed the rear door in the back end section of cargo compartment, and on a body chassis.
[0007]
[Problem(s) to be Solved by the Invention] Recently, enlargement of a truck progresses and a wing mold truck with an AUW of 25t (burden of about 13t) is spreading.
[0008] Although improvement in loading weight is expected for transport cost reduction, since the

installation weight of a cargo compartment increases, there is a limit in improvement in loading weight by the installation using the conventional metal raw material. Furthermore, since the improvement in on the strength of each part was needed in order to consider as the structure which can be opened and closed with the problem that it is weak to external force since there are many hollow parts, the increase of the thickness of an ingredient and weight increased as a result, and the installation member of the conventional cargo compartment had the problem that installation weight increased. Moreover, for steel or an aluminum raw material, a problem may arise in weatherability and corrosion resistance.
[0009] As other problems, since one cargo compartment consists of many members, great costs start the processing and assembly and buildup of installation cost poses a problem.
[0010] In such a situation, installation which used FRP for recently [ part ] is being performed. For example, the wing panel for truck pallets which used FRP is proposed by JP,4-166416,A. In this proposal, the letter core material of a block of balsa material is pinched by the protective layer of FRP, the bending plate of sandwich panel structure is constituted, the periphery section is supported from under by the channel member and the wing panel is constituted.
[0011] However, in this proposal, since the process which lightweight-ized effectiveness has and joins a Plastic solid to a channel member with a rivet etc. in the periphery section since balsa material is used as a core material is needed, lifting of installation cost will be caused. [ small ]
[0012] Moreover, although FRP is used, the FRP part does not serve as a main rigid member of a panel, that is, it does not become the part which mainly takes charge of the rigidity as the whole panel, but takes charge of the rigidity of a panel, and strong [ the great portion of ] by the balsa material as a core material, and the channel member as frame material prepared in the periphery section. Therefore, as for FRP material, the function as a surface protective layer is the main function. The lightweight-ized effectiveness by having used FRP with such structure is very small. Moreover, it is also difficult to aim at the rigidity of a panel, and improvement in reinforcement.
[0013] The technical problem of this invention is equipped with sufficient lightweight and rigidity and reinforcement, and is to offer the cargo compartment for the panel for trucks, and trucks which was moreover excellent in workability and assembly nature.
[0014]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the panel for trucks of this invention is characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member. A main rigid member means the member which bears 50 rigid% or more of the whole panel as a member containing the web and/or stiffener here, when the thing of a member which can demonstrate the rigidity required of a panel is said and it has a web and/or a stiffener, without using metal frame material etc. fundamentally. Moreover, as for the above-mentioned textiles, it is desirable that at least a kind of consolidation fiber of a carbon fiber, a glass fiber, and an aramid fiber is included.
[0015] The panel for trucks concerning this invention can be constituted also from a veneer of the above-mentioned FRP plate, and can also be constituted using two or more FRP plates.
[0016] For example, it can consider as the panel for trucks which has the sandwich structure by which the above-mentioned FRP plate has been arranged at the both sides of core material.
[0017] Moreover, it can also consider as the so-called panel for trucks of the hollow cross-section structure where the above-mentioned FRP plate is arranged in two locations which set spacing and counter mutually. The formed space may be filled up with core material.
[0018] In such a panel for trucks, when using two FRP plates, it is desirable to prepare the web which connects FRP plates, especially the web made from FRP. Moreover, it can also consider as the structure where the stiffener was combined with the FRP plate, and this stiffener can also consist of FRP. Such an FRP web and an FRP stiffener can be fabricated to an FRP plate and one.
[0019] The above-mentioned panel for trucks can be used for some of a floor panel, gate panels, wing panels, and at least one Wall panels [ at least ] (on these descriptions, the front panel and the rear panel are generically called the "Wall panel".). By optimizing the rigidity of the FRP panel, and reinforcement according to the demand characteristics of each application site, it is lightweight and the cargo

compartment for trucks of high rigidity and high intensity can be realized. Moreover, much more lightweight-ization is attained by constituting a portal frame and a center beam from FRP.
[0020] The panel for trucks concerning this invention is only the FRP panel which can fundamental really be fabricated, and since it can constitute a floor panel, a gate panel, a wing panel, and the Wall panel, it does not need special metal frame material. Therefore, in addition to lightweight-izing, manufacture and assembly are very easy and manufacture and sharp reduction of processing manday or the number of erectors are attained.
[0021]
[Embodiment of the Invention] Below, the gestalt of operation of this invention is explained at a detail, referring to a drawing. Drawing 1 shows the truck equipped with the cargo compartment for trucks concerning one embodiment of this invention, and drawing 2 is the outline top view of the truck before installing the cargo compartment for trucks.
[0022] The forward category form frame (forward category style) 4 and the front panel 5 where the cargo compartment 2 of a truck 1 was established in the anterior part side of the floor panel 3 and the floor panel 3 in drawing 1 , The back portal frame (back style of a gate) 6 prepared in the back side of the floor panel 3, and the door panel 7 as the rear panel, The head-lining section and the flank upper part of a cargo compartment 2 are formed, the wing panel [ the both-sides upper part / raising / a wing panel ] 8, and the flank lower part of a cargo compartment 2 are formed, and it has the gate panel 9 which can be opened and closed caudad on both sides. A wing panel 8 rotates focusing on a center beam 11, for example, is opened and closed by the oil hydraulic cylinder 10. The gate panel 9 is divided into the panels 9a and 9b of order in this embodiment.
[0023] Such a cargo compartment 2 extends behind the driver's seat 12 as shown in drawing 2 , for example, is installed on the body chassis 13 prolonged in parallel of two.
[0024] This invention is applicable not only to the cargo compartment for trucks which has such a configuration but the cargo compartment for trucks without a wing panel or a gate panel.
[0025] In this embodiment, the panel for trucks concerning this invention is applicable to a part of front panel 5 as the above-mentioned floor panel 3, a wing panel 8, the gate panel 9, and a Wall panel, or at least one rear panel [ at least ] 7. Moreover, portal frames 4 and 6 and a center beam 11 can also consist of FRP.
[0026] An example in the case of constituting the floor panel 3 from FRP in drawing 3 is shown. In drawing 3 , the floor panel 3 is constituted as one mold goods of the panel member 21 which mainly consists of an FRP plate, and the reinforcement member 22 which was prepared in the rear-face side and which builds and consists of combination of a joist and a horizontal joist.
[0027] In this embodiment, the panel member 21 has the sandwich structure of two FRP plates 24 [ 23 and ] 23 containing the textiles of consolidation fiber, i.e., the inner panel arranged inside a cargo compartment, the outer panel 24 arranged outside, and the both the panels 23 and the core material 25 arranged among 24, as shown in drawing 4 .
[0028] As core material 25, foam is used in this embodiment. When organic and any inorganic foam can be used and it uses organic foam as foam, the foam reinforced with consolidation fiber can also be used. Other than foam, timber, honeycomb material, etc. can be used as core material. Moreover, it is also possible to use together two or more sorts of different-species material. For example, as shown in drawing 5 , foam 25 and timber 26 can also be arranged by turns as core material between both the panels 23 and 24.
[0029] Moreover, as shown in drawing 6 , the FRP plate 23 and the web 27 which connects 24 comrades may be formed. Although forming only by resin is also possible, as for this web 27, it is desirable to form by the same FRP as the FRP plates 23 and 24, and to the FRP plates 23 and 24 and really fabricate preferably.
[0030] Moreover, as shown in drawing 7 (A), a panel member may connect two FRP plates 28 and 29 by the web 30, and may constitute them in both the FRP plate 28 and the panel member 32 in which space 31 was formed among 29. In this case, as shown in drawing 7 (B), it may be filled up with the core material 33 same with having mentioned above in space 31.

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[0031] The web which connects two FRP plates can be formed by various kinds of approaches, as shown in drawing 8 . For example, as shown in drawing 8 (A), using the FRP web formation member 34 of an I-beam, this can be fabricated to the FRP plates 23 and 24 and one, and web 34a can be formed. Moreover, as are shown in drawing 8 (B), and are shown in web 35a and drawing 8 (C) using the FRP web formation member 35 of C mold, and shown in web 36a and drawing 8 (D) using the FRP web formation member 36 of Z mold, web 37a can be formed using the FRP web formation member 37 of a core box, respectively. Furthermore, as shown in drawing 8 (E), web 38a can also be formed using the FRP web formation member 38 of the I-beam which stuck two FRP web formation members of C mold.
[0032] Two FRP plates 23 and 24, or 28 and 29 can be considered as the following configurations. However, the configuration same also in a configuration of having the FRP plate of a veneer configuration or three or more FRP plates can be taken. Moreover, when it has a web, the web can also take the same configuration as an FRP plate.
[0033] FRP which constitutes an FRP plate consists of consolidation fiber and matrix resin. as consolidation fiber, high intensity and the rate fiber of high elasticity, such as a carbon fiber, a glass fiber, an aramid fiber, and an alumina fiber, can be used, and it is independent about these -- it is -- it mixes, and it can combine further and can use. As matrix resin, thermosetting resin, such as an epoxy resin, unsaturated polyester, a phenol, and vinyl ester, is desirable in respect of a moldability and cost. However, the mixture of thermoplastics, such as polyester and a polyamide, or the above-mentioned thermosetting resin, and thermoplastics is also usable.
[0034] Although any gestalt of what has been arranged to the one direction, the thing made into the gestalt of a mat, and textiles etc. is usable as a gestalt of consolidation fiber, in this invention, the FRP plate contains the textiles of consolidation fiber at least. As textiles of consolidation fiber, bidirectional textiles and one side tropism textiles can be used. It does not interfere that what has arranged consolidation fiber to the one direction in addition to the textiles of consolidation fiber, and the thing made into the gestalt of a mat are included. And it is desirable to combine the thing of these gestalten suitably according to an application site, i.e., to take a suitable laminating configuration. At this time, the combination configuration of a different-species consolidation fiber layer can also be taken, and a certain consolidation fiber layer can also be used as the union layer of different-species consolidation fiber.
[0035] For example, the following can be illustrated as a laminating configuration of the consolidation fiber layer in the FRP plate for floor panels. As shown in drawing 9 , the consolidation fiber layer of (A) consolidation fiber which, on the other hand, carried out two or more layer laminating of the tropism textiles, Or the thing containing the consolidation fiber layer 41 containing the bidirectional textiles of consolidation fiber, (B) What has arranged the mat layer 42 of the consolidation fiber of a glass fiber or a carbon fiber in one side of this consolidation fiber layer 41, (C) -- what has arranged the mat layer 42 on both sides of the consolidation fiber layer 41, the thing which has arranged the consolidation fiber layers 41a and 41b on both sides of (D) mat layer 42, and (E) -- one of voice -- what formed the gel coat layer 43 in the thing [ like ] further can be mentioned. Moreover, when a desirable mode is illustrated more concretely, as shown in drawing 9 (F), the configuration arranged so that an FRP plate may have 4 lamination of the textiles 44 of a carbon fiber, the mat 45 of a glass fiber, the textiles 46 of a glass fiber, and the mat 47 of a glass fiber and the textiles 44 of a carbon fiber may become outside is desirable. Moreover, when an FRP plate is made into sandwich panel structure as mentioned above, including the mat of consolidation fiber, it is desirable to be arranged so that this mat may be on a core material side.
[0036] Moreover, when the longitudinal direction of a panel is made into the direction (reference direction) of 0 degree, as for the direction of orientation of the above-mentioned consolidation fiber layer 41 or the consolidation fiber in 41a and 41b (consolidation fiber layer which, on the other hand, includes the laminated structure of tropism textiles, the monolayers of bidirectional textiles or laminated structures, or such combination structures), it is desirable to take the configuration of 0 degree / 90 degrees, 0 degree / 90 degrees / **45 degrees, 0 degree / **45 etc. degrees. Here, in 0 degree, 90 degrees, and 45 degrees, it is semantics (0 degree, 90 degrees, and 45 degrees) substantially, and is the concept which includes the value of the range of about **10 degrees not to mention the thing of the

value exactly, respectively.
[0037] What is necessary is just to decide the rate of the amount of the consolidation fiber of each include angle according to demand characteristics. For example, what is necessary is to make [ many ] the rate of 0-degree layer, when the flexural rigidity of a longitudinal direction is required most strongly, and just to make [ many ] the rate of **45-degree layer, when the rate of 90-degree layer is made [ many ] and twisted, when crosswise flexural rigidity is required, and rigidity is required. Moreover, if it is in a floor panel, it is desirable to arrange 0-degree layer to the up side (to that is, inner surface side of a cargo compartment). That is, it is desirable to be allotted so that the weaving yarn which is prolonged in the one direction in the case of tropism textiles may become the longitudinal direction of a truck, and in the case of bidirectional textiles, to be allotted on the other hand, so that the warp or weft yarn may become the longitudinal direction of a truck.
[0038] Moreover, when considering as laminated structures, such as textiles of consolidation fiber, and a mat layer, it is desirable to set up the volume fraction of consolidation fiber for every layer. For example, the fiber volume fraction of the consolidation fiber layer of said consolidation fiber which consists of a laminated structure of tropism textiles on the other hand, or the consolidation fiber layer containing bidirectional textiles is set up high. In the FRP layer which is made to take charge of the rigidity of an FRP plate, and strong [ the great portion of ] in the FRP layer containing this consolidation fiber layer, sets the fiber volume fraction of said mat layer as eye the low one, and contains this mat layer You may make it mainly give other functions, for example, a surface protection feature, a periodic-damping function, a heat-conduction cutoff function, a weathering function, a fire-resistant function, etc.

[0039] Next, the core material 25 and 33 is explained. As mentioned above, foam, timber, honeycomb material, etc. can be used for core material. As foam, foam, such as polyurethane, polystyrene, polyethylene, polypropylene, PVC (polyvinyl alcohol), and silicon, can be used, for example. Although especially the construction material of honeycomb material is not limited, using for foam, for example and the thing which fabricated the same resin to honeycomb structure can be used.
[0040] Although core material can be made to take charge of a part of shearing force and compressive load, other functions can be given collectively. For example, in order to raise adiathermic [ as the whole panel material ], it can consider as the structure where voidage is high as much as possible, or in order to raise fire retardancy, a flame retarder can be blended, or the fire-resistant matter can be used together. Moreover, in order to attain lightweight-ization of the whole panel material, the lower one of the specific gravity of core material is desirable. For example, as for the specific gravity, in the case of the foam which consists of the above ingredients, choosing in 0.02 to 0.2 is desirable. When specific gravity uses less than 0.02 thing, there is a possibility that sufficient reinforcement may no longer be obtained to a load. Moreover, when specific gravity exceeds 0.2, although it becomes high, weight becomes large, and reinforcement has a possibility that the original object of lightweight-izing may be spoiled.
[0041] In the case of the veneer structure of an FRP plate, it is desirable that it is in the range of 1-10mm, and when it is the structure where the structure or space where core material is arranged is formed between FRP plates, as for the thickness of an FRP plate, to it, it is desirable that it is in the range of 20-80mm. Since there will be a possibility of leading to reduction and above-ground-floor-izing of the volume of a cargo compartment, especially in the case of sandwich structure or hollow structure even if lightweight-ization is attained when it thickens too much, it is desirable to dedicate to above-mentioned within the limits.
[0042] Next, an FRP stiffener is explained. In a floor panel, as shown, for example in drawing 3 , the vertical joists 51a and 51b and horizontal joist 51c which have been arranged in all directions (to the longitudinal direction and the cross direction of a truck) are formed as an FRP stiffener, and the reinforcement member 22 is constituted by these FRP stiffeners 51a, 51b, and 51c. Two large stiffeners 51a which is located in a crosswise center section among the stiffeners 51a and 51b prolonged in the longitudinal direction of a truck and which is prolonged in parallel (in parallel [ in this embodiment ]) is arranged on the body chassis 13 ( drawing 2 ), and is connected with the body chassis 13 by the below-mentioned connection structure.

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[0043] How two or more stiffeners are arranged should just determine according to the mechanical property required of a panel. For example, since high rigidity and reinforcement are required also desirable still more nearly locally [ since the flexural rigidity of the longitudinal direction of a truck and the cross direction and the whole twist in the case of a floor panel and rigidity is required of it / arranging a stiffener in all directions ], it is desirable to arrange a stiffener in a comparatively small pitch.
[0044] Each of such each stiffeners 51a, 51b, and 51c or the reinforcement member 22 which consists of each stiffener is fabricated in one with the panel member 21.
[0045] Each above-mentioned stiffener can take any structure of the stiffener with which it filled up with core material in the stiffener of solid structure, the stiffener of hollow structure, and the hollow stiffener. As core material for stiffeners, the same thing as the above-mentioned core material for panel members can be used.
[0046] If the typical example of the cross-section structure of a stiffener is shown, structure as shown in A-I of drawing 10 can be mentioned. In (A), the stiffener 67 with which the stiffener 64 with which the solid stiffener 61 and (B) were filled up with the hollow stiffener 62 into it, and (C) was filled up with the core material 63, and (D) were filled up with the cube type hollow stiffener 65 into it, and (E) was filled up with the core material 66, and (F) in it the hat form stiffener 68 and (G) the core material 69 The filled stiffener 70, the stiffener 71 which (H) is a hat form and was formed in the cube type, and the stiffener 73 with which (I) was filled up with the core material 72 into it are shown, respectively.
[0047] In forming such a stiffener using the laminated structure of a consolidation fiber layer, while a laminating becomes easy by allotting a mat layer appropriately, it becomes possible to give functions, such as a surface protection, suitably.
[0048] For example, as the example in the case of a core material restoration hat form stiffener is shown in the (A) of drawing 11 , and (B), while having the laminating configuration of layer R (for example, layer containing a roving cloth) / mat layer M in which the FRP layer 74 which constitutes a stiffener 70 contains mat layer M / roving and locating the mat layer M in the front face of the core material 69, it is constituted so that the mat layer M may be located in the front face of a stiffener 70. Two or more sets of configurations of this M/R/M may be prepared. For example, it can also consider as the laminating configuration of M/R/M/R/M. That is, a smooth laminating will become possible, if a mat layer is pinched in between when the laminating of the layer which has roving etc. is carried out to other layers. Moreover, adhesion with an FRP layer and the core material 69 is attained by making a mat layer intervene between the core material 69. Furthermore, it becomes the front face protected appropriately smoothly by arranging a mat layer on a front face.
[0049] Moreover, in order to raise the rigidity of a stiffener, it is effective to reinforce a stiffener locally. For example, as the example in the case of a hollow hat form stiffener is shown in (A) of drawing 12 , and (B), it can consider as the structure (B) which laid specially the consolidation fiber layer 81 (for example, textile layer of a carbon fiber) for reinforcement under the hat crowning of the hat form FRP stiffener 68, added to it, laid the consolidation fiber layer 82 for reinforcement underground specially at the flank of the (A) hat form FRP stiffener 68, or was added. Especially with such a configuration, the flexural rigidity of the longitudinal direction of a stiffener 68 can be improved substantially. If the structure of (A) and (B) is used together, stiffener 68 self twists and rigidity and gestalt maintenance reinforcement can be improved. When adding the consolidation fiber layers 81 and 82 for reinforcement to a front face, it is desirable to cover a it top in a mat layer for peeling prevention.
[0050] Moreover, as shown in drawing 13 (A), the mat layer 83 can be formed in the inner surface of the hat crowning of the hat form FRP stiffener 68, and this part can also be thickened. Thus, it becomes easy to conclude when attaching the member 84 for conclusion, for example, if it thickens.
[0051] Furthermore, especially when pinching a consolidation fiber layer (for example, consolidation fiber textiles layer) in a mat layer, it is desirable to make it a consolidation fiber layer not overflow at the stiffener edge. For example, as shown in drawing 15 (B), while pinching the consolidation fiber layer (for example, textile layer) 85 in the mat layers 86 and 87 in the both-sides flange of the hat form stiffener 70, it is desirable to lay underground into the mat layers 86 and 87 so that the head of the

consolidation fiber layer 85 may not be protruded outside.
[0052] Moreover, it is also desirable to adopt the following structures in the stiffener of a hat form or a hollow mold, especially, in order to prevent breakage of the consolidation fiber in this corner and corner, to improve reinforcement or to improve the moldability in a corner or a corner, although a corner and a corner will exist in an FRP layer.
[0053] For example, the example in the case of a core material restoration hat form stiffener is shown in (A) - (E) of drawing 14 . (A) indicates that it was shown in (G) of drawing 10 by equivalent structure. In (B), in the junction corner with the panel member 21, while preparing a radius of circle (R) in the FRP layer 91, between the core material 69 is filled with the mat 92. 93 is a mat layer by the side of a front face. In (C), in the corner by the side of a hat crowning, while preparing a radius of circle (R) in the FRP layer 91, between the core material 69 is filled with the mat 92. In (D), beveling 95 has been performed to the inner corner of the FRP layer 94 by the side of a hat crowning, and the corner of the core material 69. In (E), the radius of circle 96 (R) is formed in the inner corner of the FRP layer 94 by the side of a hat crowning, and the corner of the core material 69.
[0054] The connection member which connects both is prepared between stiffener 51a (leave joist) in drawing 3 , and the body chassis 13 in drawing 2 . For example, as shown in drawing 15 , waterproof plywood 101 is used as core material of stiffener 51a, and the both-sides side of stiffener 51a is equipped with the back plate 102 made from steel through the conclusion member 103 which consists of a penetration bolt. The spacer 104 for thickness adjustment is infixed between one back plate 102 and the side face of stiffener 51a. The shaft 105 which consists of a U bolt etc. is combined with a back plate 102, and it turns caudad and is installed. Stiffener 51a, as a result a floor panel are fixed on the body chassis 13 by concluding the above-mentioned shaft 105 with the double nut 107 through the back plate 106 arranged on the underside of the body chassis 13.
[0055] Between stiffener 51a and the body chassis 13, suitable shock absorbing material 108, for example, the sheet which consists of hard rubber, can be infixed. While the oscillation and impact which are going to be transmitted to a floor panel side from the body chassis 13 side are suitably absorbable with infixation of shock absorbing material 108, also when some irregularity is in the top face of a chassis 13, or the underside of stiffener 51a, it becomes possible to absorb the irregularity.
[0056] moreover, the above-mentioned structure -- setting -- the hole for conclusion member 103 insertion -- it is desirable to display beforehand the range in which drilling is possible on the side face of stiffener 51a so that it may face [ processing it and ] and the location of the hole may not interfere with the location of the web in stiffener 51a. Moreover, it is also possible to open the holes not only a hole such for conclusion but for hydraulic lines etc. about drilling.
[0057] In addition, an example of the connection structure between stiffener 51a and the body chassis 13 is shown, and the above-mentioned structure can take the structure of not only the above structures but suitable arbitration.
[0058] In order to improve the rigidity of the whole panel member, and reinforcement in the panel member concerning this invention in addition to the above stiffeners, a side frame can be prepared in one edge of the panel members. This side frame may be constituted from for example, a panel member and a really fabricated FRP member, and may be constituted in the structure which laid aluminum material etc. underground into it.
[0059] For example, as shown in drawing 16 , the FRP side frame 111 of a box section can be fabricated at the panel member 21 and one on crosswise both sides (and longitudinal direction forward trailing edge of a truck) of the truck of the panel member 21, and it can consider as the structure which arranges an aluminum plate 112 in the interior. An aluminum plate 112 can be simultaneously laid underground at the time of one shaping of the FRP side frame 111. That is, insert molding can be carried out. an aluminum plate 112 may continue at the longitudinal direction (the case where it extends in the longitudinal direction of a truck -- the direction), and may be arranged intermittently. If it arranges intermittently, the differential thermal expansion of an aluminum plate and FRP is easily absorbable. Moreover, as shown in drawing 17 , the outside surface of the FRP side frame 111 may be further reinforced with different species FRP. What is necessary is just to arrange the reinforcement FRP layer

113 over the suitable range for a suitable part.
[0060] When forming the other members 114 in the side face of a side frame 111 as shown, for example in drawing 18 if metal plates, such as an aluminum plate, are laid underground as mentioned above, these other members 114 can be attached easily and firmly using pop rivet 115 grade.
[0061] Drawing 19 shows the side frame 116 which has another structure. In this example, the aluminum plate 117 of a cross-section L typeface is laid underground in the FRP side frame 116 of a cross-section L typeface. In such structure, it becomes possible to attach the hook 118 for rope credit easily and firmly, for example.
[0062] The above FRP panels (it contains a panel member independent case and in the case of [ both ] a stiffener or a panel with a side frame) can be fabricated in independent or combination of the hand lay up method, a sheet winding, the vacuum backing method, the pressing method, and the RTM method (the resin transfer molding method). When the shaping approach is desirable and it is really [ according to the hand lay up method etc. the case of a floor panel / perfect ] the below-mentioned wing panel, it fabricates in each parts unit and the approach of joining and unifying with adhesives etc. later can also be adopted.
[0063] In the panel material concerning this invention, various facing may be prepared in the outside surface. As facing, timber, a metal, rubber, foam, FRP, plastics, a nonwoven fabric, etc. can be used, for example.
[0064] For example, a wood slab can be stuck on the top face of a floor panel, a floor line can be formed, or the laminating of the polyester nonwoven fabric can be carried out to a top face, it can an FRP floor panel and really be fabricated, and the floor line which has a surface drag coefficient near timber can also be constituted. By raising a surface drag coefficient, slipping tightness is made with the floor line which improved.
[0065] Moreover, special facing is also producible as shown, for example in drawing 20 . The facing 120 shown in drawing 20 constitutes a core material 121 from an FRP layer which has a mat and a roving layer, forms the polyester nonwoven fabric layer 122 at least in one side of a core material 121, and hardens and fabricates these to one with matrix resin. If the cross eye is attached to the nonwoven fabric layer 122, moderate surface roughness is obtained and it is effective in nonskid. Moreover, even if a front face is somewhat deleted during an activity, moderate surface roughness is maintained by the connoted nonwoven fabric layer. Moreover, curvature can also be prevented, if it considers as vertical symmetry structure as shown in drawing 20 .
[0066] Furthermore, protection of a panel member front face can be aimed at by preparing facing. What is necessary is just to choose the optimal facing according to the object for this surface protection, corresponding to the part of a panel member.
[0067] For example, as an example about the case of a floor panel is shown in drawing 21 , it is desirable to select high ingredients, such as abrasion resistance, proof-compressive-load nature, and slipping-proof nature, in the range 124 which constitutes the floor line of the floor panel 123. the range 125 covering a part of underside of the floor panel 123, and side face -- -proof -- scattering -- high ingredients, such as a sex (impact absorptivity), are desirable. Moreover, in the range 126 of the side face of the floor panel 123, the ingredient, other hit tightness, for example, external impact load, which has a high property to the collision of members is desirable.
[0068] Although the panel member concerning this invention makes a key objective lightweight-ization of the cargo compartment for trucks etc., it is desirable [ a member ] locally besides a lightweight property to have the following properties as the whole panel member.
[0069] for example, the flexural rigidity 130 of the whole [ in / as the case of a floor panel is shown in drawing 22 / the longitudinal direction of a truck ] and the flexural rigidity 131 of the whole in the cross direction -- twisting -- rigidity -- it is desirable that it is more than level with 132 and the local flexural rigidity of a floor. Flexural rigidity [ in / the case of a floor panel / the longitudinal direction of a truck ] is 7x105 N-m2. Above, it twists and rigidity is 1.5x105 N-m2. It is desirable that it is above. these flexural rigidity -- twisting -- rigidity -- own rigidity of an FRP plate -- the design with a web and a stiffener suitable with last thing, and arrangement -- addition of a side frame etc. can attain further.

[0070] moreover, the flexural rigidity above-mentioned to a floor panel -- it twists and properties, such as properties, such as high intensity, high periodic damping, high impact reinforcement, low specific gravity, and low thermal conductivity, and a suitable surface drag coefficient for nonskid [ which was mentioned above ], are also required besides rigidity.
[0071] Moreover, although the cargo compartment for trucks is required to be able to carry out [ low floor ]-izing generally, in cargo compartments, such as the conventional product made from aluminum, it becomes possible to realize efficiently by using the panel material which starts this invention in low floor-ization with a limitation.
[0072] For example, as shown in (A) of drawing 23 , and (B), by increasing the rigidity of the crosswise center section of the truck of the floor panels 141 and 144 rather than the rigidity of the crosswise both-sides section, the rigidity (especially longitudinal direction flexural rigidity of a truck) of the whole floor panel can be raised, and the overall height of a stiffener is made small, and low floor-ization can be realized as a result. In the example shown in drawing 23 (A), between stiffeners 143, the FRP layer 142 for reinforcement is added and the rigidity of this part is raised. In the example shown in (B), while enlarging FRP thickness between stiffeners 145 from the first, about the both-sides part, it has formed in the shape of a taper. The taper section can be easily formed by carrying out sequential buildup of the number of laminatings of a consolidation fiber layer as it goes to a crosswise center section. The abbreviation of the stiffener prolonged crosswise [ of a truck ] with such structure is also possible.
[0073] Moreover, as shown in drawing 24 , the consolidation fiber layers 148 and 149 which have effectiveness in rigid improvement at the floor line [ of the floor panel 146 ] and underside side of a stiffener 147 can be preponderantly arranged in the location distant from the cross-section neutral axis, or the increase of the amount of consolidation fiber and the approach which has ****ed enough and is carried out of the part can also be taken. For example, what is necessary is just to arrange many 0-degree layers (layer prolonged in the longitudinal direction of a truck) in the consolidation fiber layer 148 or the consolidation fiber layer 149, in raising the flexural rigidity in the longitudinal direction of a truck.
[0074] Furthermore, with the stiffener 152 arranged in the underside side of the floor panel 151, as shown in drawing 25 , if a part of reinforcement which should constitute a part of body chassis 153, or the body chassis 153 should take charge of is made to bear, since height h of the part body chassis 153 can be decreased at least, reduction of height H to the floor line of the floor panel 151 is attained as a result, and low floor-ization is attained. Furthermore, shaping-ization is also FRP-izing of the body chassis 153, or really [ with the floor panel 151 of the body chassis 153 / FRP ] realizable.
[0075] Furthermore, a stiffener and a web can take various kinds of configurations for a raise in the rigidity of the whole panel member, and high-intensity-izing. If it illustrates, the structure of the panel members 154, 155, and 156 as shown in (A) of drawing 26 , (B), and (C), and the structure of further others can be taken.
[0076] As mentioned above, although the floor panel has mainly been explained, the panel material concerning this invention is applicable also to a gate panel, a wing panel, the front panel, and the rear panel. What is necessary is to change setting out suitably or just to add a new device according to the demand characteristics of each panel.
[0077] Drawing 27 shows the example of 1 configuration of the gate panel 160. This gate panel 160 is characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member. As shown in drawing 28 (A), the gate panel 160 allots the core material 162 which consists of foam in the FRP plate 161, and arranges timber 163 inside a connection with a lower floor panel. The crevice 164 which extends in the longitudinal direction of a truck is a slot for lashing rail wearing. The above-mentioned FRP plate 161 contains the bidirectional textiles of the consolidation fiber allotted so that warp or weft yarn may become the longitudinal direction of a truck, and the textiles of the consolidation fiber allotted so that warp or weft yarn may become in the direction which crosss diagonally to the longitudinal direction of a truck.
[0078] Moreover, since the gate panel for trucks has a possibility that a gate panel up edge may scrape with these ropes, a belt, etc. using the rope for immobilization of a loading object, a belt, etc., the covering material 165 which becomes a gate panel up edge from a wear-resistant ingredient is made to

cover in drawing 27 (B). As covering material, metal sheet metal, a synthetic-resin plate, a plywood, etc. can be used.
[0079] Moreover, (A) of drawing 29 , (B), and (C) show other examples of a gate panel. Especially the lashing rail applied part is elaborated. In case (A) of drawing 29 attaches a lashing rail in a crevice 164, in order to conclude it using a rivet or a screw, it is the example which inserted the member 166 for connection and was covered with the skin material 167. As a member 166 for connection, metallicity sheet metal (steel, aluminum, etc.) or FRP is desirable.
[0080] When a lashing belt is concluded, in order that the big force may act, it is easy to become a reinforcement top problem by the shake of a car body and a loading object. Therefore, as shown in drawing 29 (B), it is desirable to connect an inner panel and an outer panel by the web 168 which consists of skin material made from FRP, and it can raise the reinforcement of a lashing rail applied part by this.
[0081] Moreover, as shown in drawing 29 (C), the reinforcement of a lashing rail applied part can be improved also by fixing the insertion material 169, such as a plywood, honeycomb material, and a synthetic-resin plate, with laying under the ground or a rivet, a bolt, etc. between an inner panel and an outer panel.
[0082] Drawing 30 is the outline sectional view showing the example of an assembly of the metallic ornaments (lashing rail) for attaching a lashing belt on a gate panel. The lashing rail 170 is arranged in the crevice 164 of the gate panel upper part, and is being fixed to the connection material 166 laid underground in the panel with the rivet 171.
[0083] Moreover, since it twists on a gate panel especially and rigidity is required of it with the flexural rigidity in the longitudinal direction of a truck, it is desirable to arrange many layers allotted so that consolidation fiber may become the consolidation fiber layer which constitutes an FRP plate substantial in the **45-degree direction to the longitudinal direction of a truck. For example, it is desirable that the **45-degree consolidation fiber layer occupies 30% or more to a full-strength-ized fiber layer.
[0084] As the one whole gate panel, the flexural rigidity in the longitudinal direction of a truck is 2x104 N-m2. Above, it twists and rigidity is 1x104 N and m2. It is desirable that it is above.
[0085] Moreover, while twisting and aiming at rigid improvement, in order to secure the reinforcement of the lashing rail mounting section especially, it is also desirable to arrange core material of a different kind appropriately. For example, as an example is shown in drawing 31 , the core material 172 which becomes the both sides of the web 168 of the mounting section of the lashing rail 170 from timber can be arranged, and the rigidity of this part and improvement in on the strength can be aimed at. In this example, the covering material 173 made from aluminum is arranged further at the upper bed section.
[0086] Moreover, since it may be difficult to allot a **45-degree consolidation fiber layer to FRP Itabe who constitutes the crevice 164 for lashing rails, considering as the following division configurations is also possible. As shown in drawing 32 , for example, nothing [ of 2 division member of members 174 and 175 / the junction structure and nothing ], The consolidation fiber layer allotted so that consolidation fiber may become the plate-like section 176 of a member 174 substantial in the **45-degree direction is prepared. Twist mainly in this part, rigidity is made to take charge of, and you may make it constitute other parts from a layer allotted so that consolidation fiber may become substantial in the 0-degree direction, a layer allotted so that it may become substantial in the 90-degree direction, and a mat layer (M). And especially, by the lashing rail applied part 177, if the plate 179 which consists of an aluminum plate etc. is arranged between the FRP layer 178 and the mat layer M so that it may expand to drawing 33 and may be shown for example, it will become possible to reinforce only this part specially.
[0087] Furthermore, since a gate panel may contact the portal frame of for example, the order section shockingly at the time of closing motion, it is desirable to give a buffer function to this part or to reinforce this part. For example, with the structure shown in drawing 34 , the mat reinforcement layer 182 (for example, glass fiber mat layer) is arranged into the part which contacts the portal frame 181 of the gate panel 180, and the rubber layer 183 is formed on it. Drawing 35 shows the gate panel 185 which carried out insert molding of the aluminum plate 184 of L typeface into FRP further.
[0088] As for the wing panel used as a cargo compartment for trucks, the cross section is usually

constituted by L typeface. Moreover, as an approach of forming a stiffener in a wing panel, there are an approach of fabricating the stiffener made from FRP simultaneously and the approach of joining with adhesives etc. the stiffener made from FRP fabricated separately, after fabricating skin material beforehand at the time of shaping of the FRP skin material which forms an outside surface. If a stiffener is really fabricated by L typeface in the case of the latter, since it is difficult to give sufficient ******, adhesion workability is bad, it becomes impossible to obtain sufficient reinforcement and there is a possibility that quality may deteriorate. Therefore, after dividing a stiffener into the head-lining section and the side-attachment-wall section in the corner section of a wing panel and pasting up the stiffener and FRP skin material by which division shaping was carried out, it can consider as the wing panel which was excellent in assembly-operation nature, and was excellent in rigidity and reinforcement by joining between each stiffeners by which division shaping was carried out by other members.

[0089] Drawing 36 shows an example of the wing panel concerning this invention. To the inner surface side of the head-lining section 191 which this wing panel 190 becomes from an FRP plate, and the side-attachment-wall section 192, i.e., an FRP plate, Stiffeners 191a and 192a are formed in the location inside a cargo compartment, respectively, and Ribs 193a, 193b, and 193c are formed also in the corner section inner surface side of the point of the head-lining section 191, the soffit section of the side-attachment-wall section 192, and a both joint, respectively. Stiffeners 191a and 192a also consist of FRP. The stiffeners 191a and 192a which consist of this FRP can also be fabricated to the head-lining section 191 and the side-attachment-wall section 192 which consist of FRP, and one, can be fabricated on another object, and can also be combined with the head-lining section 191 and the side-attachment-wall section 192.

[0090] In order to improve the rigidity of the whole wing panel, and reinforcement, it is effective to constitute in the structure where prepared the reinforcement member in the corner section inner surface side especially, or the corner section itself was reinforced. For example, as are shown in drawing 37 (A) and it is shown in the structure which formed the reinforcement member 197 joined to the corner section of a wing panel 196 over the head-lining section and the side-attachment-wall section, the structure which formed the gusset 198 as shown in (B), and (C) While forming the reinforcement section 200 in the corner section of a wing panel 199 As shown in the structure which formed the reinforcement sections 201 and 202 in the soffit section of the point of the head-lining section, and the side-attachment-wall section, and (D), the structure which formed wing-panel 203 self in the thickening sections 204, 205, and 206 in the corner section, the head-lining section head, and the side-attachment-wall section soffit can be taken. Although all of these reinforcement member and the reinforcement section can be constituted from FRP, they are good also as structure of using other construction material and laying an aluminum plate etc. underground into FRP.

[0091] What is necessary is just to make the reinforcement structure of the head-lining section head of the above-mentioned wing panel, or a side-attachment-wall section soffit into the edge reinforcement structure of the floor panel mentioned above, the same structure, or the structure according to it.

[0092] It is characterized by this wing panel having an FRP plate containing the textiles of consolidation fiber as a main rigid member. A certain thing is required flexural rigidity overall also as a wing panel, and more than the level that twists and has rigidity. Therefore, while allotting a consolidation fiber layer from which consolidation fiber serves as a direction (0 degree / 90 degrees) substantially on the basis of the longitudinal direction of a truck, in order to twist and to secure rigidity, it is desirable to allot a **45-degree consolidation fiber layer.

[0093] For example, the textiles of the consolidation fiber contained in the FRP plate which constitutes a wing panel are bidirectional textiles, and it is desirable to be allotted so that the warp or weft yarn may become the longitudinal direction of a truck. Moreover, in order to twist and to also set up rigidity highly especially, it is desirable that the textiles of the consolidation fiber allotted so that an FRP plate may become in the direction in which warp or weft yarn crosss diagonally to the longitudinal direction of a truck further are included.

[0094] The flexural rigidity in [ in / especially / a wing panel ] the longitudinal direction of a truck is 1x104 N-m2. It is desirable above that the flexural rigidity of the hit by the unit length in the direction

which intersects perpendicularly with the longitudinal direction of a truck is more than 3x103 N-m2 / m. Such demand characteristics are fulfilled by setting up appropriately arrangement of consolidation fiber, the reinforcement member mentioned above, and a reinforcement structure.

[0095] Moreover, when the FRP plate which constitutes a wing panel contains the textiles and the mat of consolidation fiber, it is desirable that the mat is arranged inside, i.e., the location inside the cargo compartment of a truck. By such arrangement, the front face by the side of a wing-panel inner surface can be made smooth.

[0096] Moreover, a wing panel is usually attached so that it can rotate up to a center beam. The structure of this part is constituted as shown in drawing 38 . With the structure shown in drawing 38 , a wing panel 208 is connected with a center beam 207 through a hinge 209, and the hinge 209, the center beam 207, and the wing panel 208 are connected using the connection means of cargo lock 210 grade. In order to secure the connection reinforcement by the cargo lock 210, insert molding of the aluminum plate 212 is carried out to the edge connection section 211 of a wing panel 208. Although this example constitutes the center beam 207 from steel or aluminum, when it also constitutes a center beam 207 from FRP, it is desirable to form the same aluminum plate as the above etc.

[0097] Furthermore, as shown, for example in drawing 39 , it can also consider as the wing panel 214 which added the lining material 213 to the location inside a cargo compartment to the inside 215 of a stiffener 215, i.e., a stiffener. Although it is combinable using a blind rivet 216 etc. to the stiffener 215 of a wing panel 214, as for the lining material 213, it is desirable at this time to thicken the crowning of a stiffener 215 by allotting the mat 217 grade of a glass fiber, and to enable it to secure bond strength.

[0098] It can consider as the structure same also about the Wall panel 5 of a cargo compartment, i.e., the front panel, and the rear panel 7 which mainly constitutes a door panel as the floor panel mentioned above. For example, as an example of the rear-doors panel 220 is shown in (A) of drawing 40 , and (B), panel material can be constituted in the sandwich structure of two FRP plates 221 and 222 containing the textiles of consolidation fiber, and the core material 223 allotted between them. That is, it is the Wall panel for trucks characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member.

[0099] As textiles of consolidation fiber, bidirectional textiles are desirable and it is desirable to be allotted so that the warp or weft yarn may become in the vertical direction of a truck. Moreover, it twists, and when rigid reservation is required, it is desirable that the textiles of consolidation fiber with which the above-mentioned FRP plate is arranged so that it may become in the direction in which warp or weft yarn crosss diagonally to the vertical direction of a truck further are included.

[0100] Furthermore, it is also possible to FRP-ize a center beam 11. Moreover, although it is metal fundamentally about the portal frames 4 and 6 of order, it is possible to FRP-ize also about these in the future.

[0101] For example, an example of the center beam 230 FRP-ized to drawing 41 is shown. In this example, although considered as the combination structure of the core material 231 made from a metal (for example, aluminum and steel), and the FRP member 232 prepared in the surroundings of it, it is also possible to constitute all from FRP. Moreover, core material may be arranged inside. When inserting the insertion member for junction to other members in the interior of an FRP member, a metal or timber is suitable for it, and can choose it as it according to the reinforcement to need.

[0102] In order to demonstrate much more lightweight-ized effectiveness of the cargo compartment for trucks, it is desirable to combine some each part material mentioned above.

[0103] For example, the cargo compartment for trucks where the cargo compartment for trucks where the cargo compartment for trucks where the floor panel 3 and a wing panel 8 consist of FRP or the floor panel 3, a wing panel 8 and the front panel 5, and/or the rear panel 7 consist of FRP or the floor panel 3, and a wing panel 8 and the gate panel 9 consist of FRP, and the cargo compartment for trucks where the front panel 5 and the rear panel 7 consist of FRP further in addition to it can be illustrated. Furthermore, the cargo compartment for trucks where a center beam 11 also consists of FRP has still higher lightweight-ized effectiveness. Moreover, since each part material can really be fabricated at the time of FRP shaping, with shaping, simplification of assembly operation is attained, it is lightweight and the

cargo compartment for trucks excellent in assembly nature can really [ this ] be obtained.
[0104] furthermore, a truck is put to direct sunlight for a long time -- **** -- in order to prevent that the atmospheric temperature inside a cargo compartment rises, a heat ray reflective film may be stuck on the part equivalent to which direct sunlight is, and coatings, such as usual acryl lacquer and melanin resin, may be applied to it.
[0105]
[Example] The floor panel of the cargo compartment for trucks, a wing panel, a gate panel, the front panel, and a rear-doors panel consisted of FRP. As shown in drawing 3 and drawing 4 , it constituted from core material which consists of synthetic-resin foam (specific gravity 0.1) which prepared the floor of a floor panel between the inner panel (2mm in thickness) which consists of skin material made from carbon fiber reinforced plastic (CFRP), an outer panel (4mm in thickness), and both panels. And the stiffener which consisted of CFRPs crosswise [ of a truck / the direction of a longitudinal direction and crosswise ] was formed in the underside, and it fabricated to the sandwich panel and one which constitute the above-mentioned floor.
[0106] The wing panel was formed in the configuration shown in drawing 36 , and epidermis formed the stiffener which consists of a CFRP of the hat form prolonged crosswise [ of a truck ] while preparing a reinforcing rib like a graphic display in both sides and the corner section using skin material with a thickness [ made from CFRP ] of 0.7mm.
[0107] The gate panel was formed in the configuration shown in drawing 27 , and consisted of core material which consists of synthetic-resin foam arranged between the inner panel which consists of skin material with a thickness [ made from CFRP ] of 1.5mm, an outer panel, and both panels.
[0108] The front panel and a rear door panel were formed in the structure shown in drawing 40 , and consisted of core material which consists of synthetic-resin foam prepared between the inner panel which consists of skin material with a thickness [ made from CFRP ] of 0.8mm, an outer panel, and both panels.
[0109] Installation assembly was performed as a cargo compartment for trucks using these each part material. The present metal member was used except the above-mentioned FRP member. Consequently, installation section weight is 2,500kg and 1,500kg large lightweight-ization of it was attained from 4,000kg at the time of using the present charge of metal lumber.
[0110]
[Effect of the Invention] In the cargo compartment for trucks concerning this invention, while excelling in lightweight-ized effectiveness and easy-izing assembly operation by constituting a floor panel, a wing panel, a gate panel, the Wall panel, etc. from FRP containing the textiles of consolidation fiber, the cargo compartment for trucks where cost was reduced can be offered. Therefore, the weight of the truck which performed this installation is also mitigated and loading weight increase becomes possible as a result.
[0111] Lightweight-ized effectiveness is attained to about 30 - 50% compared with the conventional cargo compartment by setting for example, a floor panel, a wing panel, a gate panel, and Wall to FRP.

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[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view of the truck concerning one embodiment of this invention.
[Drawing 2] It is a top view before cargo-compartment installation of the truck of drawing 1 .
[Drawing 3] It is the perspective view of the floor panel of the truck of drawing 1 .
[Drawing 4] It is the fragmentary sectional view showing an example of the panel for trucks of this invention.
[Drawing 5] It is the fragmentary sectional view showing another example of the panel for trucks of this invention.
[Drawing 6] It is the fragmentary sectional view showing still more nearly another example of the panel for trucks of this invention.
[Drawing 7] It is the fragmentary sectional view showing still more nearly another example of the panel for trucks of this invention.
[Drawing 8] It is the fragmentary sectional view showing still more nearly another example of the panel for trucks of this invention.
[Drawing 9] It is the fragmentary sectional view showing the example of the FRP plate of the panel for trucks of this invention.
[Drawing 10] It is the sectional view showing the example of the stiffener of the panel for trucks of this invention.
[Drawing 11] It is the sectional view showing an example of the stiffener of the panel for trucks of this invention.
[Drawing 12] It is the sectional view showing another example of the stiffener of the panel for trucks of this invention.
[Drawing 13] It is the sectional view showing still more nearly another example of the stiffener of the panel for trucks of this invention.
[Drawing 14] It is the sectional view showing still more nearly another example of the stiffener of the panel for trucks of this invention.
[Drawing 15] It is drawing of longitudinal section showing an example of the connection structure of the floor panel for trucks of this invention, and a body chassis.
[Drawing 16] It is partial drawing of longitudinal section showing an example of the floor panel for trucks of this invention.
[Drawing 17] It is partial drawing of longitudinal section showing another example of edge structure of the floor panel for trucks of this invention.
[Drawing 18] It is partial drawing of longitudinal section at the time of attaching other members in the edge of drawing 16 and the floor panel of drawing 17 .
[Drawing 19] It is partial drawing of longitudinal section showing still more nearly another example of edge structure of the floor panel for trucks of this invention.
[Drawing 20] It is the fragmentary sectional view showing an example of the facing prepared in the floor panel for trucks of this invention.

[Drawing 21] It is partial drawing of longitudinal section showing each range in the case of preparing facing on the floor panel for trucks of this invention.
[Drawing 22] It is the outline perspective view showing the mechanical characteristic required of the floor panel for trucks of this invention.
[Drawing 23] It is outline drawing of longitudinal section showing the example of structure of the floor panel for trucks of this invention.
[Drawing 24] It is outline drawing of longitudinal section showing another example of structure of the floor panel for trucks of this invention.
[Drawing 25] It is outline drawing of longitudinal section showing still more nearly another example of structure of the floor panel for trucks of this invention.
[Drawing 26] It is outline partial drawing of longitudinal section showing still more nearly another example of structure of the floor panel for trucks of this invention.
[Drawing 27] It is the outline perspective view showing an example of the gate panel for trucks of this invention.
[Drawing 28] It is drawing of longitudinal section showing the example of the gate panel for trucks of this invention.
[Drawing 29] It is drawing of longitudinal section showing another example of the gate panel for trucks of this invention.
[Drawing 30] It is drawing of longitudinal section at the time of attaching a lashing rail in the gate panel of (B) of drawing 29 .
[Drawing 31] It is drawing of longitudinal section showing still more nearly another example of the gate panel for trucks of this invention.
[Drawing 32] It is decomposition drawing of longitudinal section showing still more nearly another example of the gate panel for trucks of this invention.
[Drawing 33] It is amplification partial drawing of longitudinal section of the lashing rail mounting section of the gate panel of drawing 32 .
[Drawing 34] It is the fragmentary sectional view showing still more nearly another example of the gate panel for trucks of this invention.
[Drawing 35] It is the fragmentary sectional view showing still more nearly another example of the gate panel for trucks of this invention.
[Drawing 36] It is the perspective view showing an example of the wing panel for trucks of this invention.
[Drawing 37] It is the outline block diagram showing another example of the wing panel for trucks of this invention.
[Drawing 38] It is partial drawing of longitudinal section showing an example of the connection structure of the wing panel for trucks of this invention, and a center beam.
[Drawing 39] It is the fragmentary sectional view showing an example in the case of attaching lining material in the wing panel for trucks of this invention.
[Drawing 40] It is the outline block diagram showing an example of the Wall panel for trucks of this invention.
[Drawing 41] It is the cross-sectional view showing an example of the center beam for trucks of this invention.
[Drawing 42] It is the decomposition perspective view of the conventional floor panel for trucks.
[Drawing 43] It is the decomposition perspective view of the conventional wing panel for trucks.
[Description of Notations]
1 Truck
2 Cargo Compartment
3 Floor Panel
4 Six Portal frame
5 Front Panel (Wall Panel)
7 Door Panel (Wall Panel)

h g cg b eb cg e e

8 Wing Panel
9, 9a, 9b Gate panel
11 Center Beam
13 Body Chassis
21 32 Panel member
22 Reinforcement Member
23 Inner Panel (FRP Plate)
24 Outer Panel (FRP Plate)
25 33 Core material
26 Timber
27, 30, 34a, 35a, 36a, 37a, 38a Web
28 29 FRP plate
31 Space
34, 35, 36, 37, 38 Web formation member
41, 41a, 41b, 85 Consolidation fiber layer
42, 83, 86, 87, 92, 93 Mat layer
43 Gel Coat Layer
44 Textiles of Carbon Fiber
45 47 Mat of a glass fiber
46 Textiles of Glass Fiber
51a, 51b It builds and is a joist (stiffener).
51c Horizontal joist (stiffener)
61, 62, 64, 65, 67, 68, 70, 71, 73 Stiffener
63, 66, 69, 72 Core material
74, 91, 94 FRP layer
81 82 Consolidation fiber layer for reinforcement
84 Member for Conclusion
95 Beveling
96 Radius of Circle
101 Waterproof Plywood
102 106 Back plate
103 Conclusion Member
104 Spacer
105 Shaft
107 Nut
108 Shock Absorbing Material
111 116 FRP side frame
112 117 Aluminum plate
113 Reinforcement FRP Layer
114 Other Members
115 Pop Rivet
118 Hook
120 Facing
121 Core Material
122 Nonwoven Fabric Layer
123, 141, 144, 146, 151 Floor panel
124, 125, 126 Range
142 FRP Layer for Reinforcement
143, 145, 147, 152 Stiffener
148 149 Consolidation fiber layer
153 Body Chassis

h g cg b eb cg e e

154, 155, 156 Panel member
160, 180, 185 Gate panel
161 FRP Plate
162 172 Core material
163 Timber
164 Crevice
165 173 Covering material
166 Member for Connection
167 Skin Material
168 Web
169 Insertion Material
170 Lashing Rail
171 Rivet
174 175 2 division member
176 Plate-like Section
177 Lashing Rail Applied Part
178 FRP Layer
179 Plate
181 Portal Frame
182 Mat Reinforcement Layer
183 Rubber Layer
184 Aluminum Plate
190, 196, 199, 203, 208, 214 Wing panel
191 Head-Lining Section
191a, 192a, 215 Stiffener
192 Side-Attachment-Wall Section
193a, 193b, 193c Rib
197 Reinforcement Member
198 Gusset
200, 201, 202 Reinforcement section
204, 205, 206 Thickening section
207 Center Beam
209 Hinge
210 Cargo Loc
211 Edge Connection Section
212 Aluminum Plate
213 Lining Material
216 Blind Rivet
217 Mat of Glass Fiber
220 Rear Door Panel (Wall Panel)
221 222 FRP plate
223 Core Material
230 Center Beam
231 Core Material
232 FRP Member

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[Translation done.]

h g cg b eb cg e e

* NOTICES *



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3.In the drawings, any words are not translated.

DRAWINGS

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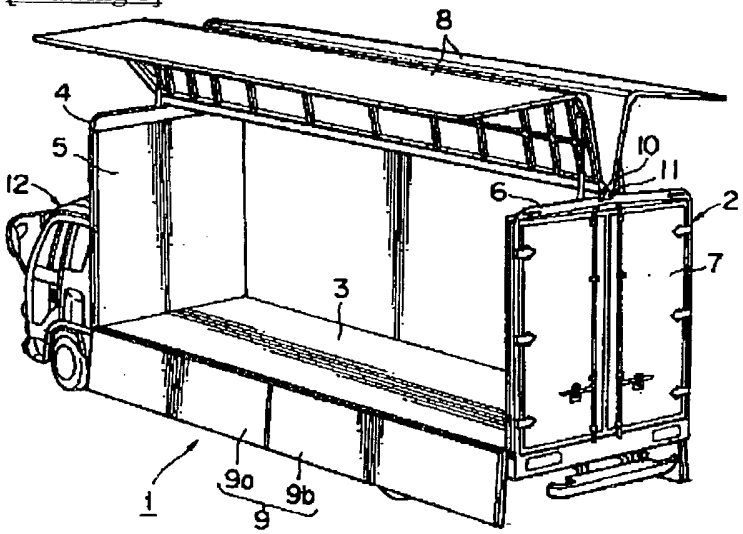


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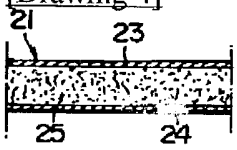


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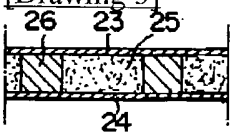


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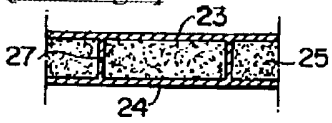


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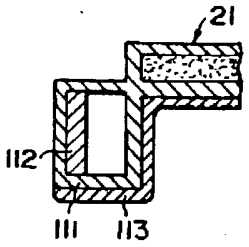


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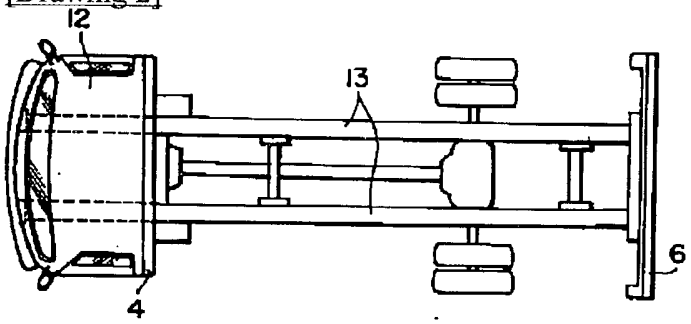


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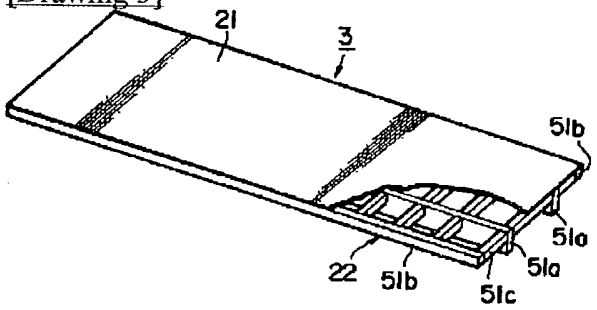


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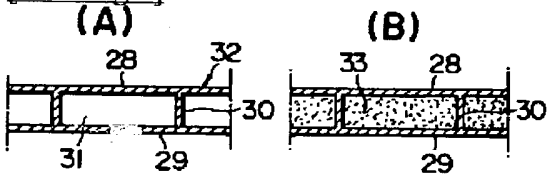


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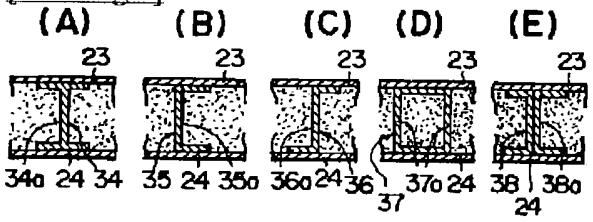


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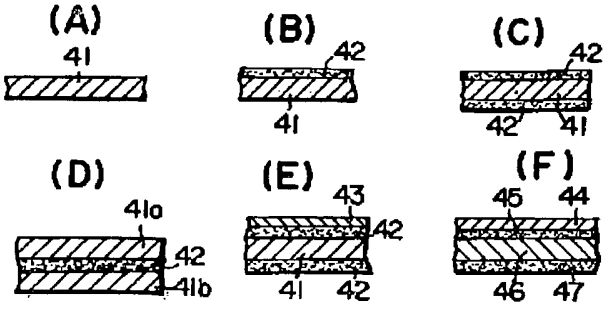


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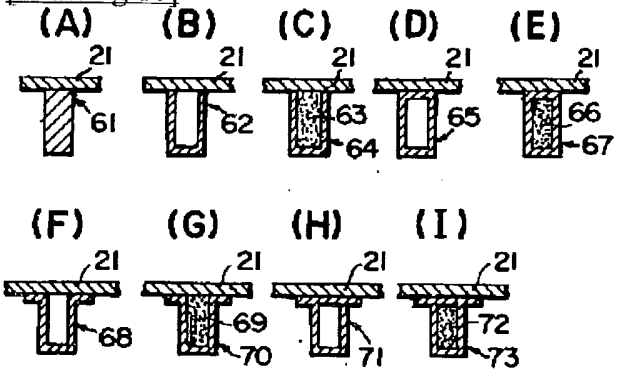


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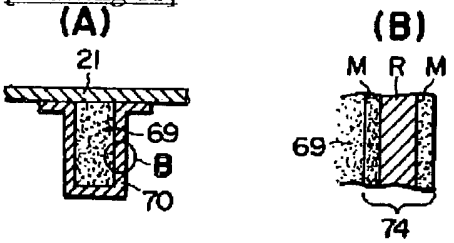


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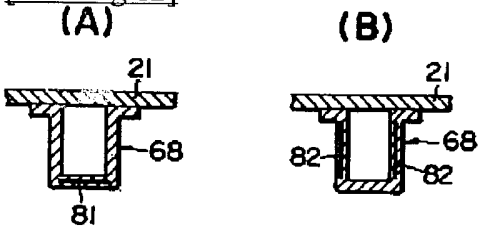


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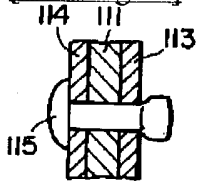


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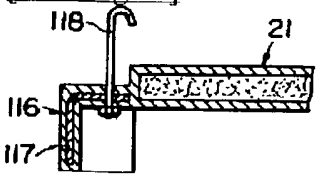


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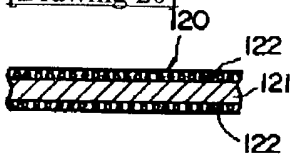


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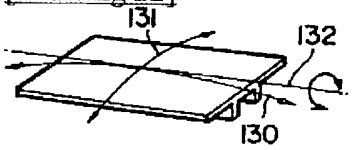


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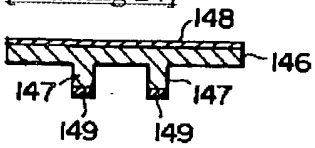


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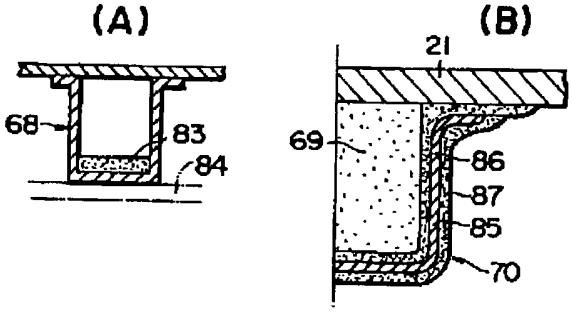


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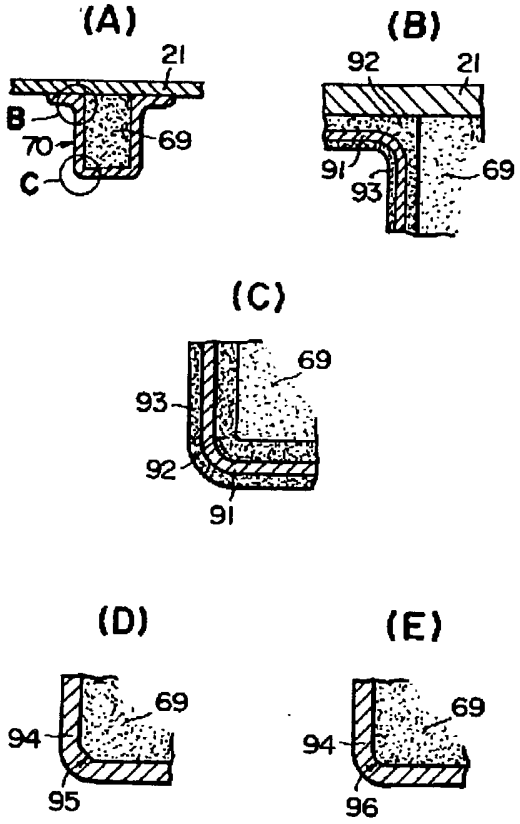


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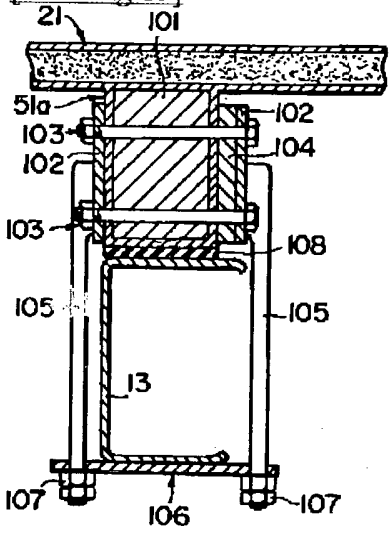


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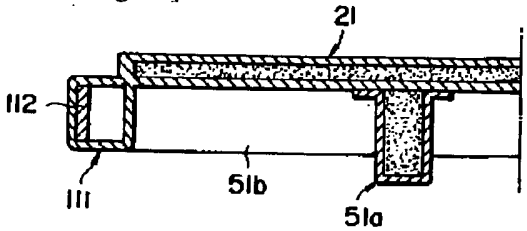


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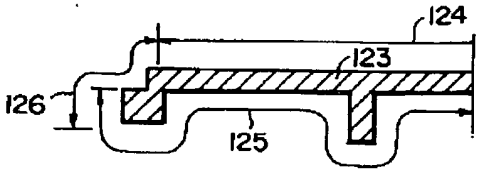


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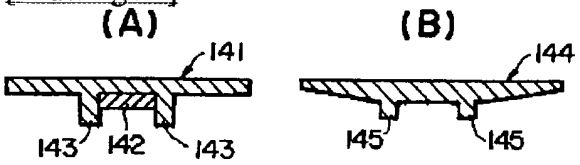


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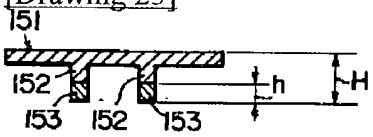


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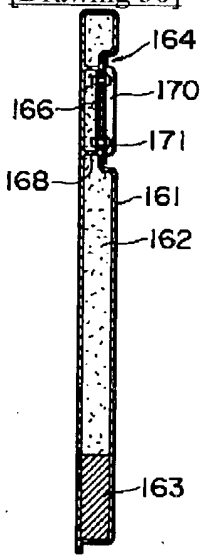


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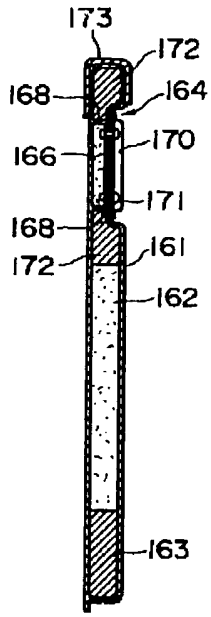


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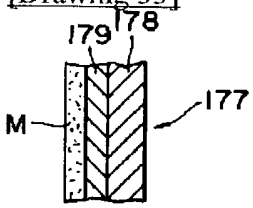


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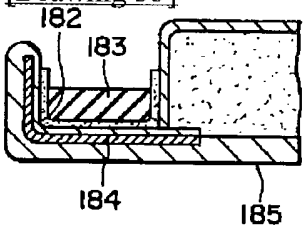


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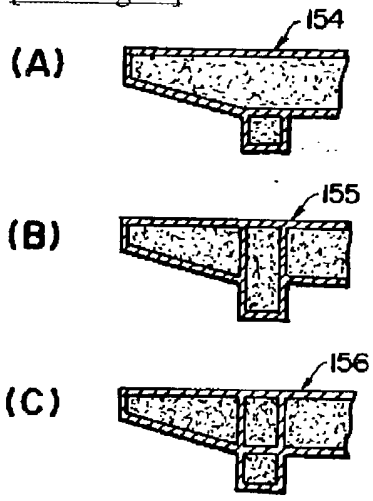


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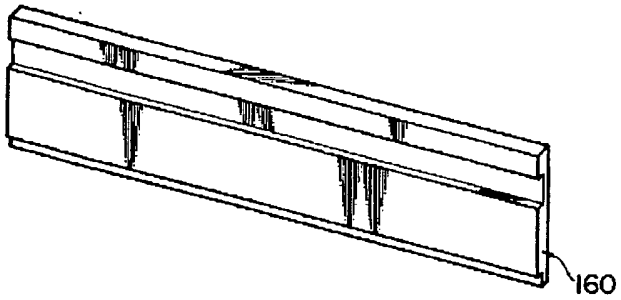


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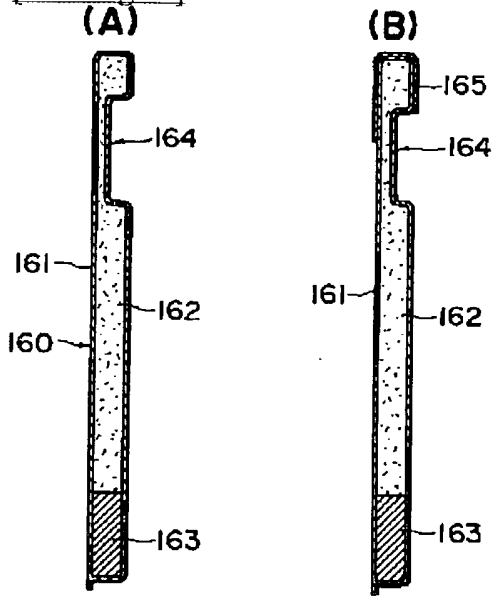


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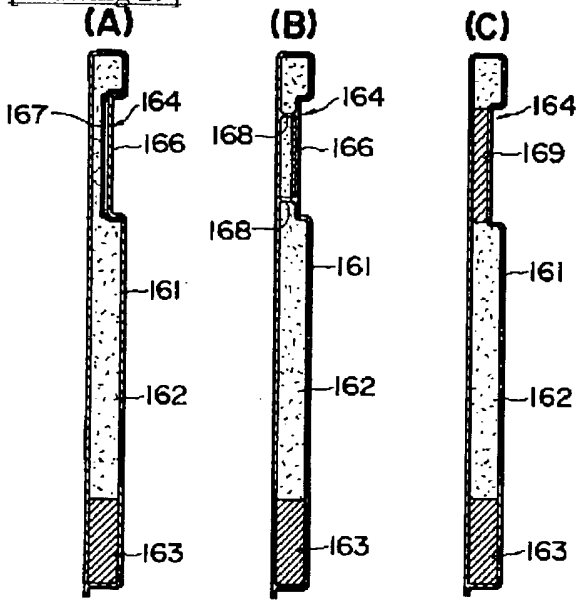


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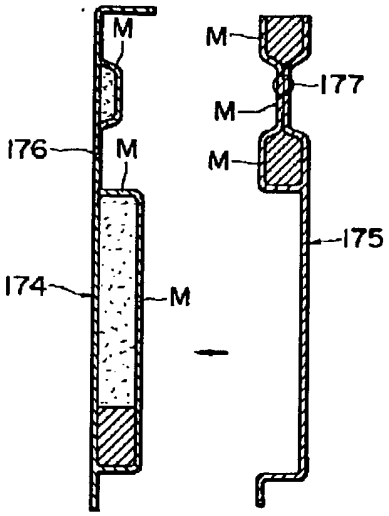


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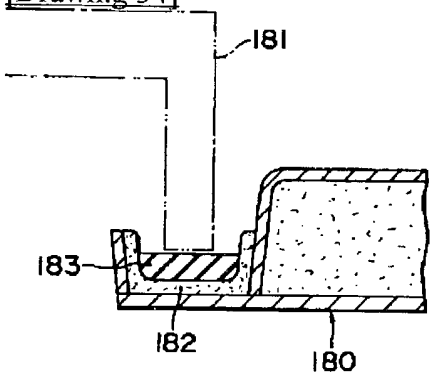


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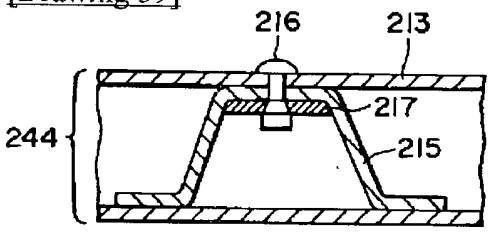


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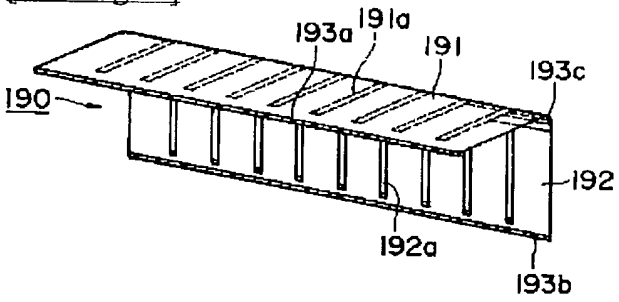


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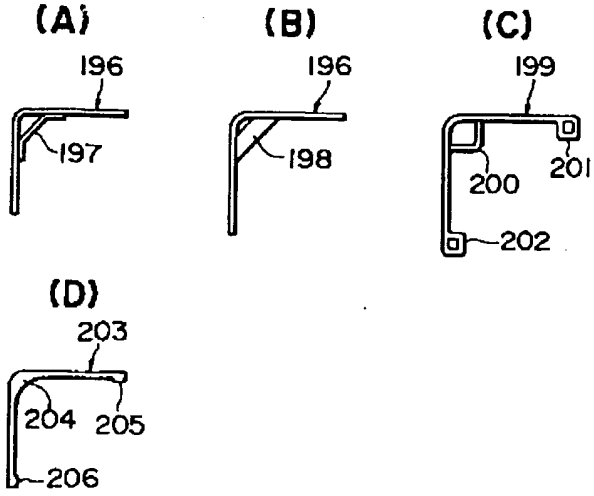


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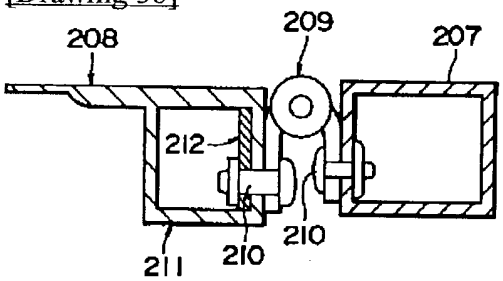


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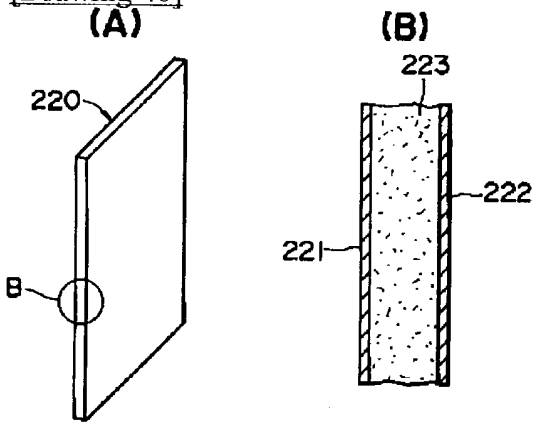


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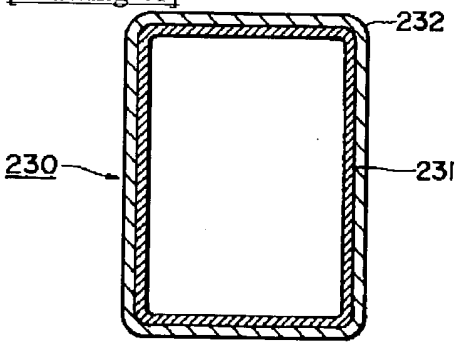


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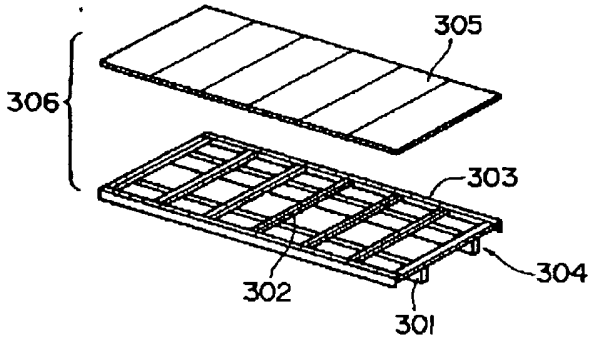


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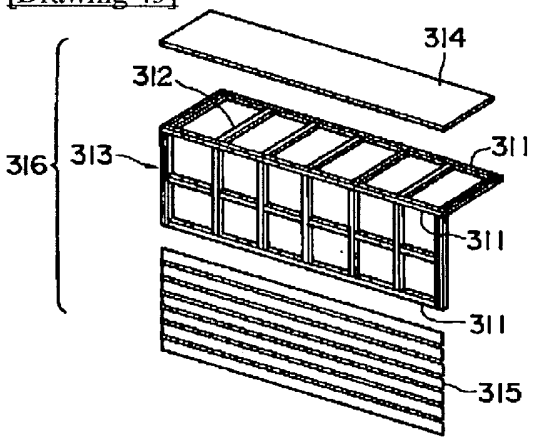


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[Translation done.]

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* NOTICES *



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## CLAIMS

[Claim(s)]
[Claim 1] The panel for trucks characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member.
[Claim 2] The panel for trucks of claim 1 which has the sandwich structure by which said FRP plate has been arranged at the both sides of core material.
[Claim 3] The panel for trucks of claim 1 by which said FRP plate is arranged in two locations which set spacing and counter mutually.
[Claim 4] The panel for trucks of claims 2 or 3 which has the web which connects FRP plates.
[Claim 5] The panel for trucks of claim 4 by which said web consists of FRP.
[Claim 6] The panel for trucks according to claim 1 to 5 by which the stiffener is combined with said FRP plate.
[Claim 7] The panel for trucks of claim 6 by which said stiffener consists of FRP.
[Claim 8] The panel for trucks of claims 6 or 7 by which said stiffener has a building envelope.
[Claim 9] The panel for trucks of claim 8 by which core material exists in the building envelope of said stiffener.
[Claim 10] Claim 2 which said core material becomes from foamed-plastics material, timber, or honeycomb material, and the panel for trucks according to claim 4 to 9.
[Claim 11] The panel for trucks according to claim 1 to 10 by which said FRP plate has facing.
[Claim 12] The panel for trucks according to claim 1 to 11 by which said textiles contain at least a kind of consolidation fiber of a carbon fiber, a glass fiber, and an aramid fiber.
[Claim 13] The panel for trucks according to claim 1 to 12 by which said FRP plate contains bidirectional textiles.
[Claim 14] The panel for trucks according to claim 1 to 13 by which said FRP plate contains tropism textiles on the other hand.
[Claim 15] The panel for trucks according to claim 1 to 14 by which said FRP plate contains the mat of consolidation fiber.
[Claim 16] The floor panel for trucks characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member.
[Claim 17] The floor panel for trucks of claim 16 which has the sandwich structure by which said FRP plate has been arranged at the both sides of core material.
[Claim 18] The floor panel for trucks of claim 17 which has the web which connects FRP plates.
[Claim 19] The floor panel for trucks of claims 17 or 18 by which said FRP plate is further arranged so that this mat may be on a core material side, including the mat of consolidation fiber.
[Claim 20] The floor panel for trucks of claim 19 arranged so that said FRP plate may have 4 lamination of the textiles of a carbon fiber, the mat of a glass fiber, the textiles of a glass fiber, and the mat of a glass fiber and the textiles of said carbon fiber may become outside.
[Claim 21] The floor panel for trucks according to claim 16 to 20 which said textiles are bidirectional textiles, and is arranged so that the warp or weft yarn may become the longitudinal direction of a truck.

[Claim 22] The floor panel for trucks according to claim 16 to 21 which builds to a rear face and has a joist and a horizontal joist.
[Claim 23] Said floor panel for trucks of claim 22 by which it builds and the joist and the horizontal joist are formed as a stiffener.
[Claim 24] The floor panel for trucks of claim 23 by which said stiffener consists of FRP.
[Claim 25] The floor panel for trucks of claims 23 or 24 by which said stiffener is formed in the hat form.
[Claim 26] The floor panel for trucks of claim 25 by which core material exists in said hat form stiffener.
[Claim 27] The floor panel for trucks according to claim 17 to 26 in the range whose thickness is 20-80mm.
[Claim 28] The floor panel for trucks according to claim 16 to 27 by which a panel has facing and this facing contains timber, a metal, rubber, foamed-plastics material, FRP, plastics, or a nonwoven fabric at least.
[Claim 29] The floor panel for trucks of claim 28 which consists of FRP in which said facing contains the nonwoven fabric of a synthetic fiber.
[Claim 30] The flexural rigidity in the longitudinal direction of a truck is 7x105 N-m2. Above, it twists and rigidity is 1.5x105 N-m2. Floor panel for trucks according to claim 16 to 29 which it is above.
[Claim 31] The wing panel for trucks characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member.
[Claim 32] The wing panel for trucks of claim 31 which said textiles are bidirectional textiles, and is allotted so that the warp or weft yarn may become the longitudinal direction of a truck.
[Claim 33] The wing panel for trucks containing the textiles of the consolidation fiber allotted so that said FRP plate may become in the direction in which warp or weft yarn crosss diagonally to the longitudinal direction of a truck further of claim 32.
[Claim 34] The wing panel for trucks according to claim 31 to 33 by which said FRP plate contains said textiles and mat of consolidation fiber, and this mat is arranged inside.
[Claim 35] The wing panel for trucks according to claim 31 to 34 by which the stiffener is combined inside said FRP plate.
[Claim 36] The wing panel for trucks of claim 35 which said stiffener becomes from FRP.
[Claim 37] The wing panel for trucks of claims 35 or 36 by which lining material is combined inside said stiffener.
[Claim 38] The wing panel for trucks according to claim 35 to 37 by which said stiffener is formed in the hat form.
[Claim 39] The wing panel for trucks according to claim 35 to 38 in which said stiffener contains the textiles of a carbon fiber.
[Claim 40] The wing panel for trucks according to claim 35 to 39 currently thickened when the crowning of said stiffener arranges the mat of consolidation fiber to the inner surface side of this crowning.
[Claim 41] The flexural rigidity in the longitudinal direction of a truck is 1x104 N-m2. Wing panel for trucks according to claim 31 to 40 whose flexural rigidity of the hit by the unit length in the direction which intersects perpendicularly with the longitudinal direction of a truck is more than 3x103 N-m2 / m above.
[Claim 42] The gate panel for trucks characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member.
[Claim 43] The gate panel for trucks containing the bidirectional textiles of the consolidation fiber on which said FRP plate is arranged so that warp or weft yarn may become the longitudinal direction of a truck, and the textiles of the consolidation fiber allotted so that it may become in the direction in which warp or weft yarn crosss diagonally to the longitudinal direction of a truck of claim 42.
[Claim 44] The gate panel for trucks of claims 42 or 43 which has the sandwich structure by which said FRP plate has been arranged at the both sides of core material.

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[Claim 45] The gate panel for trucks of claim 44 which has the web which connects FRP plates.
[Claim 46] The flexural rigidity in the longitudinal direction of a truck is 2x104 N-m2. Above, it twists and rigidity is 1x104 N-m2. Gate panel for trucks according to claim 42 to 45 which it is above.
[Claim 47] The Wall panel for trucks characterized by having an FRP plate containing the textiles of consolidation fiber as a main rigid member.
[Claim 48] The Wall panel for trucks of claim 47 which said textiles are bidirectional textiles, and is arranged so that the warp or weft yarn may become in the vertical direction of a truck.
[Claim 49] The Wall panel for trucks containing the textiles of the consolidation fiber allotted so that said FRP plate may become in the direction in which warp or weft yarn crosss diagonally to the vertical direction of a truck further of claim 48.
[Claim 50] The Wall panel for trucks according to claim 47 to 49 which has the sandwich structure by which said FRP plate has been arranged at the both sides of core material.
[Claim 51] The cargo compartment for trucks which has either claim 16 thru/or the floor panel of 30, claim 31 or the wing panel of 41, claim 42 or the gate panel of 46 and claim 47 thru/or the Wall panel of 50.
[Claim 52] The truck which has the cargo compartment of claim 51.

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